*Original Article*

# Psychological stress and coping - a preliminary study on Indian commercial airline pilots

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**The objective of the present study was to identify psychosocial stress factors and coping styles in a sample of 74 Indian commercial airline pilots. They were both interviewed and asked to complete a battery of psychological inventories covering major sources of stress such as domestic and occupational and stress outcomes. Results of the study indicated that there was a statistically significant incidence of both domestic and occupational stressors. Increase in domestic stressors was associated with an increase in coping and trait anxiety. Higher occupational stress and high anxiety were linked to lowered job satisfaction, coping and self perceived performance. Factors such as age, seniority, marital status and government/ private organisation were seen to be important factors influencing stressors and outcomes.**

**Keywords: Psychosocial stress, Coping, Civil pilots.**

In recent years the effects of stress on adaptation and human performance have received considerable attention in the aeromedical literature but relatively little is known about psychological stress in commercial airline pilots, especially in the Indian context.

Aviation psychologists have identified three types of human stress : physical stress and two types of emotional stress, cognitive and affective [1]. Few professions carry so much of responsibility in terms of lives, and the potential effects of stressful experiences are of importance to pilots, their employers, and those who regulate air travel as well as to airline passengers. Some jobs are acknowledged as potentially very stressful and the civil aviation pilot's job has been classified as a "very high risk" one [2].

Most research indicates that depending on the particular job and organisation, sources of stress together with certain personality traits may be predictive of a variety of stress manifestations , such as coronary heart disease, mental ill health, job dissatisfaction, marital disharmony and substance abuse. On the part of the organisation it manifests in the form of high absenteeism, high labour turnover, industrial relations difficulties, and poor quality control [3].

Research has been conducted in specific contexts, most of it has been undertaken to explain the relationship between stress and accidents [4]. This research subdivides into three approaches:

(a) *Pilot personality and stress.* Many studies have found a link between pilot personality and accidents [5,6,7]. Personality inadequacies in coping with stress seem to result in some form of flying impairment, especially when coupled with affective stress [1,8,9].

(b) *Life events and stress.* Most of the research in this field has concentrated on the link with accidents, most of these studies are in military aviation. One study [10] analysed commercial aircraft accidents and attributed 45% to human error on the flight deck, one of the factors outlined was the pilots' unsettled domestic life. Another [11] reported the results from a survey of Canadian civilian pilots and found that some two thirds of the life event items "served as accident markers in at least one of the pilot groups", although no single item did so across all groups.

(c) *Psychosocial stress.* A multivariate approach was developed to the study of stress in civil pilots [12]. Both occupational and domestic stressors were identified as being important. They also found that it is a combination of sources of stress that interact with the characteristics of the person combined with a failure of coping strategies that lead to stress outcomes.

In India, studies in this area have been almost negligible. One case report study cited a civil aircraft accident resulting from gross crew incoordination as a result of interpersonal factors [13]. Another study done on Air India pilots found high state and trait anxiety levels and frustration, due to feeling of stagnation at the job, as well as internal and departmental politics (14).

## Method

The preliminary sample of interviewees were obtained from the Medical Evaluation Centre at Institute of Aerospace Medicine ensuring as wide a cross section of characteristics as possible. A sample of one hundred male pilots were both interviewed and asked to complete a battery of inventories. Data for seventy four pilots are presented here, remaining questionnaires were unusable. Demographic characteristics of the sample are shown in Tables I and II. The questionnaire used was adapted from one used before [12] and covered biographical data, domestic stressors, occupational stressors and stress outcomes such as coping strategies, job satisfaction, and self perceived performance. Instead of the mental health questionnaire the State Trait Anxiety Scale [15] was included as a stress outcome measure.

*Data reduction and statistical analysis:* Kolmogorov-Smirinov one sample test for goodness of fit for normal distribution was carried out on all 300 items and all were found to be significant, indicating that the distribution was not normal . Hence all ratings were converted to binary scores and summated for each category i.e. five sources of stress (domestic, home to work factors, nature of effects, occupational, and work to home factors), and five stress outcomes (coping, job satisfaction, performance and state and trait anxiety). Along with five demographic variables (age, seniority, years with employer, flying experience and haul),

fifteen variables were analysed.

(a) $X^2$ test was done on the percentages of pilots reporting high, moderate and low stress.

(b) Pearson's product moment correlation was then applied between

  (i) each stressor and each outcome

  (ii) different stressors

  (iii) different stress outcomes and

  (iv) demographic variables and stressors and outcomes.

(c) Students 't' test was then done to see if any significant differences exist in these variables and marital status and organisational (government / private) affiliation.

**Table I : Biographical data of sample**

| Variable | | Number | % |
|---|---|---|---|
| Age Interval | 21-30 | 19 | 26 |
| | 31-40 | 19 | 26 |
| | 41-50 | 13 | 17 |
| | 51-55 | 19 | 26 |
| | > 55 | 04 | 05 |
| Martial Status | | | |
| | Married | 61 | 82 |
| | Single | 13 | 18 |
| Wife Working | | | |
| | Yes | 21 | 34 |
| | No | 40 | 66 |
| Working | | | |
| | Occasionally | 04 | 19 |
| | Part time | 05 | 24 |
| | Full time | 12 | 57 |

**Table II : Demographic work history data**

| Variable | Number | Percentage |
|---|---|---|
| **Govt.** | | |
| Air India | 24 | 32 |
| Indian Airlines | 22 | 30 |
| **Private** | | |
| Skyline NEPC | 12 | 16 |
| Jet Airways | 07 | 10 |
| East West | 03 | 04 |
| Others | 06 | 08 |
| **Aircraft Type** | | |
| A 300 | 03 | 04 |
| A 320 | 17 | 23 |
| A 310 | 11 | 15 |
| B 747 | 12 | 16 |
| B 737 | 22 | 30 |
| F 27 | 05 | 07 |
| Others | 04 | 05 |
| | Mean | SD |
| Age interval code | 2.58 | 1.26 |
| Seniority Code | 3.32 | 0.72 |
| Yrs with Employer | 8.93 | 7.97 |
| Flying Experience | 6362.48 | 4765.62 |
| Haul Type Code | 2.32 | 1.28 |

## Results

*Incidence of stressors and outcomes*

The percentage of pilots who reported the presence of various degrees of stressors and outcomes are shown in Table III. $X^2$ shows significance for all five stressors. This indicates that there is a definite presence of both domestic and occupational stress in this sample of pilots and its incidence is significantly different to that expected from the normal distribution. The incidence of stress outcomes indicates that the majority of pilots utilise coping strategies maximally and have self perceived performance levels that are good. However, only 45% of them have a high level of job satisfaction and 20% show extreme levels of anxiety.

**Table III : Percentage of pilots reporting stress**

| Stressor | Degree of Stress | | | $X^2$ |
|---|---|---|---|---|
| | Low | Mod | High | |
| Domestic | 16 | 58 | 26 | 5.71* |
| Home to Work factors | 09 | 32 | 59 | 101.88** |
| Nature of home factors | 12 | 28 | 60 | 107.14** |
| Occupational | 13 | 41 | 46 | 49.97** |
| Work to home factors | 09 | 42 | 49 | 59.98** |

* $p<0.05$ ** $p<0.01$

### Correlations between stressors and stress outcomes

Significant findings are shown in Table IV. Increased domestic stressors are associated with increased coping and increased trait anxiety. Increased occupational stressors and work to home factors are linked to reduced coping, job satisfaction, and performance. All other findings were non significant.

**Table IV : Significant correlations between stressors and stress outcomes**

| Stressor | Stress Outcome | | Correlation |
|---|---|---|---|
| Value | | | |
| Domestic | Coping | r | 0.24* |
| | Trait Anxiety | r | 0.23* |
| Occupational | Coping | r | -0.27** |
| | Job satisfaction<br>Coping<br>Performance | R | -0.33 |
| Work to Home Factors | Coping | r | -0.28** |
| | Job satisfaction<br>Coping<br>Performance | R | -0.31 |

* $p<0.05$, ** $p<0.02$

### Correlations between types of stressors

All correlations excepting for one shown in Table V were significant. Increased job stressors were not found to be associated with home factors which may affect the pilot at work. Otherwise it appears that domestic and occupational stressors are correlated with each other.

### Correlations between stress outcomes

Significant correlations are found in Table VI. Increase in job satisfaction, coping and better performance are associated with reduced state and trait anxiety.

**Correlations between demographic variables and stressors and outcomes**

(a) Demographic variables such as age, seniority, hours of flying experience, type of haul were not significantly associated with any stressor or stress outcome excepting for performance. Increase in age, seniority and years with the employer were significantly correlated with better self perceived performance ($r$ = 0.42, 0.33, and 0.31 respectively, all p's < 0.01). Multiple R value was 0.42.

(b) In the married vs single status comparison, job satisfaction and performance were seen to differ. Married pilots were significantly older ('t' = 8.51, $p < 0.01$) and reported more satisfaction with their jobs and performance ('t' = 2.12 and 2.28 respectively, $p < 0.05$).

(c) In the government vs private airline pilot comparison, significant findings are shown in Table VII. Government pilots reported more occupational stressors, increased work to home stress and were seen to experience more stress effects. They also had decreased job satisfaction and increased anxiety levels when compared with private airline pilots. Government pilots were also significantly different as a group because of their increased age, more flying experience and different type of haul flights.

Table V : Correlations between stressors

| Domestic | Occupational | Work to home | Home to work | Nature of Effects |
|---|---|---|---|---|
| G | H | I | J | K |
| G | 0.39** | 0.43** | 0.36** | 0.26* |
| H | | 0.46** | 0.07 | 0.51** |
| I | | | 0.51** | 0.49** |
| J | | | | 0.52** |

*p < 0.05, **p < 0.01

Table VI : Correlations between stress outcomes

| Coping | Job satisfaction | Performance | State anxiety | Trait anxiety |
|---|---|---|---|---|
| M | N | O | P | Q |
| M | 0.01 | 0.03 | -0.25* | -0.01 |
| N | | 0.18 | -0.34** | -0.30** |
| O | | | -0.36** | -0.31** |
| P | | | | -0.54** |

*p < 0.05, **p < 0.01

## Discussion

The increased incidence of both occupational and domestic stress in the civil aircrew substantiates research elsewhere which finds similar sources of psychological stress in these pilots [12]. However, these were generally found to have work related labels and a lesser number were related to domestically related items. Results of our study corroborates this finding of an increased percentage incidence of occupational stressors as compared to domestic. This may explain why only 45% of the pilots have an adequately high level of job satisfaction and do not conform to the satisfaction stereotype. However, in this study even though higher percentage of pilots reported only a moderate degree of domestic stressors, effects were reported in a larger percentage when compared to occupational stress effects. This suggests that the nature of these two sources of stress differ in terms of degree and pervasiveness of effects, even a moderate degree of domestic stress is seen to have more pervasive effect than a corresponding degree of occupational stress.

Results of stressors and outcomes suggests that the type of stressor (domestic/ occupational) is linked differently to outcomes especially to coping strategy. Domestic stressors are associated with increased coping and increased trait anxiety. This could be because predisposition to trait anxiety affects the perception and response to situational stressors. Occupational stressors, however, are found to be associated with reduced coping. This could be due to differences in the appraisal of the stressor in terms of desirability and controllability [15], and this would also

**Table VII - Significant differences between government and private airline pilots**

| Variable | Govt. Orgn. Mean (SD) scores | Pvt. Orgn. Mean (SD) scores | 't' Value |
|---|---|---|---|
| Stressors | | | |
| Occupational | 20.15 (9.88) | 15.77 (7.20) | 3.04** |
| Work to Home | 11.81 (3.25) | 9.54 (4.42) | 3.51** |
| Nature of effects | 8.87 (2.57) | 7.76 (3.50) | 2.17* |
| Stress Outcomes | | | |
| Job satisfaction | 8.64 (3.87) | 12.04 (2.59) | 5.83** |
| State anxiety | 32.47 (8.58) | 28.12 (5.91) | 3.54** |
| Demographic | | | |
| Age interval code | 2.74 (1.30) | 2.27(1.13) | 2.31* |
| Yrs. with employer | 12.54 (7.72) | 2.28 (1.61) | 11.04** |
| Flying experience (hrs) | 7170.98 (4866.93) | 4900.96 (4198.73) | 3.00** |
| Type of haul code | 2.89 (1.22) | 1.27 (0.44) | 10.60** |

* $p < 0.05$, $p < 0.01$

** $p < 0.01$

explain why occupational stressors were also found to be linked to lowered job satisfaction and self perceived performance. In general, the study found that pilots who reported increased domestic stressors also reported increased occupational stressors, once again giving credence to the importance of differences in individual appraisal.

The finding that 20% of the sample pilots reported clinically elevated levels of anxiety is also in line with previous studies [12,14] which show that this group of pilots can further be studied on this basis only. With regard to the relationship between different stress outcomes there was a negative correlation between state and trait anxiety and job satisfaction, self perceived performance, and coping, indicating the detrimental effects of anxiety. Job satisfaction was positively correlated with performance.

Differences in demographic variables showed that age, seniority, and years with employer were positively correlated with performance. Previous research [12,16] found that senior pilots tend to have higher levels of job satisfaction and also rate their performance as better. Marital status was also correlated with job satisfaction and performance and could be due to two reasons. Firstly, it could be due to their use of coping strategies mostly found to be related to stability of home and the supportive role of the wife. Secondly, it could be because of the different mean ages of the two groups, as discussed above.

The finding that differences existed in pilots of government as compared to private organisations on variables such as occupational stressors, anxiety, and job satisfaction points towards organisational issues found to be of significance in previous studies [17]. These may be categorised around task, role and interpersonal demands as well as organisational structure and leadership.

## Implications

From the individual perspective, the prevalence and pervasiveness of domestic stressors and outcomes suggests that domestic stability can act as a powerful positive influence on stressors in terms of social support from the wife and family but if levels of stressors are unduly high, effects can be far more overriding than occupational stressors of the same degree. Job dissatisfaction and high anxiety levels are also likely to cause individualised stress outcomes which may not be conducive to either the individual or the organisation.

A greater awareness can be developed by organisations of the potential role of psychosocial stresses and their implications, since no attempt appears to have been made to manage for such issues. Such a deficiency ought to be rectified, particularly because of the relative contribution made by human error to accidents and incidents.

Some attention should be focused on the development of systems to identify both organisational and individual stresses and signs related to them, to prevent long term detrimental outcomes. One of the well known ways [12,17] in which this problem can be tackled, is by implementing stress management programmes so that remedial and protective action can be taken to deal with occupational and domestic stressors which also helps the individual develop healthy coping strategies.

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